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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/988,937	11/19/2001	Ralf Bohnke	282663US8X	9361

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EXAMINER	
DEAN, RAYMOND S	

ART UNIT	PAPER NUMBER
2618	

NOTIFICATION DATE	DELIVERY MODE
12/13/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	09/988,937	BOHNKE ET AL.	
	Examiner	Art Unit	
	Raymond S. Dean	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *18-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *18-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed September 19, 2007 have been fully considered but they are not persuasive.

Examiner respectfully disagrees with Applicants' assertion on Page 10, 2nd Paragraph "Therefore, Hashem fails to disclose or suggest loading tables containing x subcarriers ...". Hashem is cited for it's teaching of tables containing Link Modes (LMs) for groups of subcarriers. The LM comprises a modulation level or scheme. The tables contain a plurality of LMs and thus modulation levels or schemes thus there will be low, standard, and high modulation levels or schemes. Furthermore, a group of subcarriers comprises x, y, or z amount of subcarriers thus the number of subcarriers to modulated is defined. The limitations in question thus read on Hashem.

Examiner respectfully disagrees with Applicants' assertion on Page 12, 1st Paragraph "Therefore, a person of ordinary skill in the art would not ..." for the same reasons set forth above.

Examiner respectfully disagrees with Applicants' assertion on Page 10, 7th Paragraph "Additionally, Applicants respectfully submit that there would be no reason to incorporate ...". Keller and Hashem both teach an OFDM system wherein groups of subcarriers are modulated with a plurality of modulation schemes. It would have thus been obvious to one of ordinary skill in the art at the time the invention was made to use the above method of Hashem in the system of Keller in order to achieve the same result

of modulating a plurality of groups of subcarriers with a plurality of modulation schemes. Furthermore, Hashem teaches wherein the modulation levels for the groups are in a table stored in memory in the base station (See Col. 3 lines 47 – 50, 64 – 66).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 18 – 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keller et al. (Vehicular Technology, IEEE Transactions on, Volume: 49, Issue: 5, Sept 2000, Pages: 1893 – 1906) in view of Hashem et al. (US 6,701,129).

Regarding Claim 18, Keller teaches a wireless multi-carrier transmission method, wherein a multi-carrier transmission uses n modulated frequency sub carriers (n is an integer number), a fading condition of each sub carrier is detected to generate fading channel profile information (Section II (A. System Model), Section II (D. Choice of the Modulation Scheme, First Paragraph)), the modulation of each sub carrier is determined by the following steps: x sub carriers for modulation with a lower modulation scheme, y sub carriers for modulation with a standard modulation scheme, and z sub carriers for modulation with a higher modulation scheme (x, y, and z are integer numbers) (Section II (D. Choice of the Modulation Scheme, First and Second Paragraph, Section 3), 2nd – 4th paragraphs); wherein the sum of x, y, and z is n and a resulting number of coded bits

of a multi-carrier symbol is constant (Section II (D. Choice of the Modulation Scheme, Second Paragraph, Section II (A. System Model, Second Paragraph lines 22 – 23, Third Paragraph lines 1 - 4), Section II (D. Choice of the Modulation Scheme, Section 1, Third Paragraph lines 10 – 16), Section II (F. Sub band Adaptive OFDM and Channel Coding, First Paragraph lines 8 – 13), a desired SNR determines a particular BER which further determines a particular throughput or number of bits per symbol, said throughput or number of bits per symbol corresponds to a particular modulation scheme); and modulating the x sub carriers having low fading channel profile information with the lower modulation scheme, modulating the y sub carriers having medium fading channel profile information with the standard modulation scheme, and modulating the z sub carriers having high fading channel profile information with the higher modulation scheme (Section II (A. System Model), Section II (D. Choice of the Modulation Scheme, First and Second Paragraph, Section 1, Third Paragraph lines 10 – 16)).

Keller does not teach pre-calculating a plurality of adaptive loading tables, each loading table containing x sub carriers for modulation with a lower modulation scheme, y sub carriers for modulation with a standard modulation scheme, and z sub carriers for modulation with a higher modulation scheme (x, y, and z are integer numbers) and selecting one of the adaptive loading tables for said multi-carrier transmission.

Hashem teaches pre-calculating a plurality of adaptive loading tables, each loading table containing x sub carriers for modulation with a lower modulation scheme, y sub carriers for modulation with a standard modulation scheme, and z sub carriers for modulation with a higher modulation scheme (x, y, and z are integer numbers) (Cols. 3

lines 45 – 52, 7 lines 1 – 11) and selecting one of the adaptive loading tables for said multi-carrier transmission (Cols. 3 lines 45 – 52, 7 lines 1 – 11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the above method of Hashem in the system of Keller as an alternative means for providing adaptive modulation.

Regarding Claim 19, Keller in view of Hashem teaches all of the claimed limitations recited in Claim 18. Keller further teaches wherein the transmission power of the sub carriers are adapted such that the total transmission power of all sub carriers remains unchanged (Section II (A. System Model, Second Paragraph Equation (2)), the overall SNR K comprises the SNRs of all of the sub carriers K sub n, said SNRs K sub n are directly dependent on the transmission power of the sub carriers n thus when a particular overall SNR K is desired the transmission power of said sub carriers n will be adapted to achieve said desired SNR K).

Regarding Claim 20, Keller in view of Hashem teaches all of the claimed limitations recited in Claim 19. Keller further teaches the transmission power of sub carriers having a higher modulation scheme is enhanced to compensate for sub carriers which are not modulated (Section II (D. Choice of the Modulation Scheme, First Paragraph), Section II (A. System Model, Second Paragraph Equation (2)), the overall SNR K comprises the SNRs of all of the sub carriers K sub n, said SNRs K sub n are directly dependent on the transmission power of the sub carriers n thus when a particular overall SNR K is desired the transmission power of said sub carriers n will be adapted to achieve said desired SNR K, when a plurality of said sub carriers n are not

modulated there will be no transmission of said sub carriers n thus the transmission power of the modulated sub carriers n will be modified to compensate for the transmission power loss caused by the said non modulated sub carriers n such that said desired SNR K is still achieved).

Regarding Claim 21, Keller in view of Hashem teaches all of the claimed limitations recited in Claim 18. Keller further teaches adaptive loading information reflecting the adaptation of the modulation scheme of the sub carriers is exchanged between a transmitter and a receiver of the multi-carrier transmission (Figure 1a, Figure 1b, Section I Paragraphs 5 and 6).

Regarding Claim 22, Keller in view of Hashem teaches all of the claimed limitations recited in Claim 21. Keller further teaches the receiver calculates a suitable loading based on received signals, - the receiver sends the adaptive loading information in a signaling field and uses the calculated adaptive loading in the data field of a transmitted data train (Figure 1b, Section I Paragraph 5 lines 18 – 21, Section I Paragraph 6 lines 33 – 38, this is a packet based wireless system thus there will be a data train comprising data fields).

Regarding Claim 23, Keller in view of Hashem teaches all of the claimed limitations recited in Claim 18. Keller further teaches a plurality of sub carriers is bundled into groups and the same modulation scheme is applied for all sub carriers belonging to the same group (Section II (D. Choice of Modulation Scheme, Second Paragraph lines 1 – 6)).

Regarding Claim 24, Keller in view of Hashem teaches all of the claimed limitations recited in Claim 23. Keller further teaches a plurality of adjacent sub carriers is bundled into one group (Section II (D. Choice of Modulation Scheme, Second Paragraph lines 1 – 6)).

Regarding Claim 25, Keller teaches a computer readable medium for storing therein a computer software program running on a wireless transmitting device (Figure 1a, Figure 1b, Section I Paragraphs 5 and 6, this shows a mobile station and base station configured to employ the AOFDM algorithm, a mobile station comprises wireless transmitting devices such as wireless phones and mobile computers, said phones/computers comprise CPUs that control the operation of said phones/computers, there is software that runs on board said CPUs that enable said CPUs to carry out the required functions, the mobile stations of the AOFDM system will therefore comprise CPUs with on board software that enables said CPUs to run the said AOFDM algorithm, said software is stored in memory such as RAM) for executing wireless multi-carrier transmission multi-carrier that uses n modulated frequency sub carriers (n is an integer number), a fading condition of each sub carrier is detected to generate fading channel profile information (Section II (A. System Model), Section II (D. Choice of the Modulation Scheme, First Paragraph)), the program determines the modulation of each sub carrier by the following steps: x sub carriers for modulation with a lower modulation scheme, y sub carriers for modulation with a standard modulation scheme, and z sub carriers for modulation with a higher modulation scheme (x, y, and z are integer numbers) (Section II (D. Choice of the Modulation Scheme, First and Second Paragraph, Section 3), 2nd –

4th paragraphs); wherein the sum of x, y, and z is n and a resulting number of coded bits of a multi-carrier symbol is constant (Section II (D. Choice of the Modulation Scheme, Second Paragraph, Section II (A. System Model, Second Paragraph lines 22 – 23, Third Paragraph lines 1 - 4), Section II (D. Choice of the Modulation Scheme, Section 1, Third Paragraph lines 10 – 16), Section II (F. Sub band Adaptive OFDM and Channel Coding, First Paragraph lines 8 – 13), a desired SNR determines a particular BER which further determines a particular throughput or number of bits per symbol, said throughput or number of bits per symbol corresponds to a particular modulation scheme) and modulating the x sub carriers having low fading channel profile information with the lower modulation scheme, modulating the y sub carriers having medium fading channel profile information with the standard modulation scheme, and modulating the z sub carriers having high fading channel profile information with the higher modulation scheme (Section II (A. System Model), Section II (D. Choice of the Modulation Scheme, First and Second Paragraph, Section 1, Third Paragraph lines 10 – 16)).

Keller does not teach pre-calculating a plurality of adaptive loading tables, each loading table containing x sub carriers for modulation with a lower modulation scheme, y sub carriers for modulation with a standard modulation scheme, and z sub carriers for modulation with a higher modulation scheme (x, y, and z are integer numbers) and selecting one of the adaptive loading tables for said multi-carrier transmission.

Hashem teaches pre-calculating a plurality of adaptive loading tables, each loading table containing x sub carriers for modulation with a lower modulation scheme, y sub carriers for modulation with a standard modulation scheme, and z sub carriers for

modulation with a higher modulation scheme (x, y, and z are integer numbers) (Cols. 3 lines 45 – 52, 7 lines 1 – 11) and selecting one of the adaptive loading tables for said multi-carrier transmission (Cols. 3 lines 45 – 52, 7 lines 1 – 11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the above method of Hashem in the system of Keller as an alternative means for providing adaptive modulation.

Regarding Claim 26, Keller teaches a wireless multi-carrier transmission device for a multi-carrier transmission uses n modulated frequency sub carriers (n is an integer number) (Figure 1a, (Section II (A. System Model)), comprising: a fading channel profile unit for detecting a fading condition of each sub carrier (Figure 1a, the channel quality is determined thus there will be a fading channel profile unit for detecting a fading condition); x sub carriers for modulation with a lower modulation scheme, y sub carriers for modulation with a standard modulation scheme, and z sub carriers for modulation with a higher modulation scheme (x, y, and z are integer numbers) (Section II (D. Choice of the Modulation Scheme, First and Second Paragraph, Section 3), 2nd – 4th paragraphs); wherein the sum of x, y, and z is n and a resulting number of coded bits of a multi-carrier symbol is constant (Section II (D. Choice of the Modulation Scheme, Second Paragraph, Section II (A. System Model, Second Paragraph lines 22 – 23, Third Paragraph lines 1 - 4), Section II (D. Choice of the Modulation Scheme, Section 1, Third Paragraph lines 10 – 16), Section II (F. Sub band Adaptive OFDM and Channel Coding, First Paragraph lines 8 – 13), a desired SNR determines a particular BER which further determines a particular throughput or number of bits per symbol, said throughput or

number of bits per symbol corresponds to a particular modulation scheme); selecting means for selecting one of the adaptive loading tables for said multi-carrier transmission (Section II (D. Choice of the Modulation Scheme, First and Second Paragraph), Section 3), 2nd – 4th paragraphs, See Also Response To Arguments above); and an adaptive bits-to-symbol mapping unit for modulating x sub carriers having low fading channel profile information with the lower modulation scheme, modulating the y sub carriers having medium fading channel profile information with the standard modulation scheme, and modulating the z sub carriers having high fading channel profile information with the higher modulation scheme (Section II (A. System Model), Section II (D. Choice of the Modulation Scheme, First and Second Paragraph, Section 1, Third Paragraph lines 10 – 16)).

Keller does not teach an adaptive loading calculation unit for pre-calculating a plurality of adaptive loading tables, each adaptive loading table containing x sub carriers for modulation with a lower modulation scheme, y sub carriers for modulation with a standard modulation scheme, and z sub carriers for modulation with a higher modulation scheme (x, y, and z are integer numbers) and selecting means for selecting one of the adaptive loading tables for said multi-carrier transmission.

Hashem teaches an adaptive loading calculation unit for pre-calculating a plurality of adaptive loading tables, each adaptive loading table containing x sub carriers for modulation with a lower modulation scheme, y sub carriers for modulation with a standard modulation scheme, and z sub carriers for modulation with a higher modulation scheme (x, y, and z are integer numbers) (Cols. 3 lines 45 – 52, 7 lines 1 –

11) and selecting means for selecting one of the adaptive loading tables for said multi-carrier transmission (Cols. 3 lines 45 – 52, 7 lines 1 – 11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the above method of Hashem in the system of Keller as an alternative means for providing adaptive modulation.

Regarding Claim 27, Keller in view of Hashem teaches all of the claimed limitations recited in Claim 26. Keller further teaches the adaptive loading calculation unit bundles respectively a plurality of sub carriers into groups and applies the same modulation scheme on all sub carriers belonging to the same group (Section II (D. Choice of Modulation Scheme, Second Paragraph lines 1 – 6)).

Regarding Claim 28, Keller in view of Hashem teaches all of the claimed limitations recited in Claim 27. Keller further teaches the adaptive loading calculation unit (8) bundies a plurality of adjacent sub carriers into one group (Section II (D. Choice of Modulation Scheme, Second Paragraph lines 1 – 6)).

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond S. Dean whose telephone number is 571-272-7877. The examiner can normally be reached on Monday-Friday 6:00-2:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward F. Urban can be reached on 571-272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Raymond S. Dean
November 26, 2007

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